

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improved Process for the Production of Hollow Bodies from Cellulose Products and other Plastic Masses.

I, KURT BRATRING, of Bussestrasse 26, Luckenwalde, near Berlin, Germany, of German nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a process and apparatus for the production of hollow bodies from cellulose products and other plastic masses.

It is already known that hollow bodies may be made from cellulose products and other plastic masses in moulds comprising several relatively displaceable wedge-shaped parts the outer separating edges being covered by a rubber cover to be drawn over the entire mould. These known moulds are useful industrially but have been shown to have several disadvantages. Thus, these moulds are limited with reference to the diameter and lengths of the hollow bodies, as when the hollow bodies to be produced have a very small diameter and/or very great length the various wedge-shaped parts of the mould have to be kept very flat, and considerable force is required to effect their relative displacement for the purpose of releasing the mould from the hollow body produced, because the moulds composed of the wedges are firmly pressed together by the hollow bodies formed thereon. In the manufacture of hollow bodies by the use of these known moulds it has been further shown that the lines of separation of the mould parts at times are not fully covered by the rubber and can be detected, though faintly, on the hollow bodies formed.

In connection with the production of hollow bodies from cellulose products, particularly those having a small diameter and great length, it has been proposed to make the bodies on metal moulds provided with a valve and after drying to release the cellulose products from the mould by means of compressed air. These moulds are also useful industrially. A considerable pressure, often exceeding one atmosphere excess pressure, is always necessary for releasing

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the hollow bodies, or during the blowing operation it is necessary to release the hollow bodies from the mould by a rolling motion. In blowing in the air to strip the hollow body from the metal mould it cannot always be avoided that the edge of the valve at times is visible in the hollow body as a sharp line.

The present invention avoids all the disadvantages referred to and enables hollow bodies from the smallest to the largest diameter to be produced from cellulose products, the quality of the finished hollow bodies with regard to appearance, particularly smoothness of the surface, and with regard to the uniformity of the hollow bodies being quite marked.

The invention consists in a method of producing hollow bodies from cellulose products and other plastic masses, in which the plastic mass is applied to a mould for example of wood, metal and the like, over which an elastic skin is placed under preliminary tension in the direction in which the hollow body is stripped from the mould, and in which after solidification of the mass air is blown in between the mould and the rubber skin in order to strip the hollow body and the elastic skin from the mould. The preliminary tension of the rubber skin is removed before air is blown in.

A further feature of the invention is a method of the kind specified, in which prior to the application of the elastic skin the mould is smoothed or polished by suitable means, for example by applying a coating or layer of lacquer, talcum, glycerine or the like.

The mould for carrying out the method is to be provided with means, for example a groove having a fitting rubber ring or the like in order that the elastic skin, for example of rubber, placed on the mould may be subjected to tension substantially in the direction in which the hollow body is stripped from the mould.

The mould for carrying out the method has one or more channels for permitting the blowing in of the air, the channel or channels advantageously having enlarged outlet orifices, for example of,

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funnel shape.

Further features of the invention will be appreciated from the following description and the accompanying drawings illustrating several forms of the invention by way of example.

Figure 1 shows one embodiment of the invention with a hollow body formed on the mould.

Figure 2 shows the mould according to the invention during the blowing operation whereby the hollow body together with the elastic skin is stripped from the mould.

Figure 3 shows the hollow body after being stripped from the mould, the rubber skin in consequence of the removal of the tension having already been substantially released from the hollow body.

Figure 4 shows a further embodiment of the invention having a very enlarged channel for the blowing in of the air.

Figure 1 shows a mould for producing hollow bodies from cellulose products and essentially comprises a massive core A having a central longitudinally extending air channel B. The core of the mould may be made of various materials. Ordinarily for cheapness wood is used although various artificial masses, such as plaster of Paris, cement paper mache and so forth, and also substances composed of artificial resins or albuminous materials may be equally well used. Further, metals are often very suitable for forming the core of the mould, particularly if—for the purpose of reducing the weight of the mould—the air channel B is enlarged and consequently the wall of the mould is made as thin as possible, as shown in Figure 4. For making a mould of the latter type, glass porcelain, and so forth is particularly suitable for several purposes.

An elastic skin C, for example of rubber, is placed under tension over the fixed core A and is held in a tensioned condition. The tensioning of the rubber skin can be effected for example, by a rubber ring D firmly held in a groove extending around the mould. Instead of the groove shown in the figures 1 and 4 for receiving the rubber ring the mould can also be provided with a part P of reduced diameter, as shown in fig. 2, to facilitate the removing of the rubber ring. The elastic sheath for the mould is preferably made of rubber, although other elastic materials not attacked by the solvents for the material of the hollow bodies may be used, for example polymerization products of organic compounds or glycerine-containing gelatine masses.

The pipe joint F provided at both ends

with screw threads serves as a handle for the mould. One end G of the pipe joint F is screwed in an air tight manner into the massive core A thereby forming a connection with the air channel B. By means of the other end H of the screw-threaded joint F it is possible to secure the moulds in wooden bars K provided with nuts J, and by assembling a number of such bars to unite a large number of moulds for the mechanical dipping operation in dipping batteries.

By a single or repeated immersion, for example, into a solution of acetyl cellulose in acetone a hollow body may now be formed on the moulds over which the rubber skin has been placed. Solutions of cellulose esters and ethers in organic solvents, concentrated gelatine solutions or solutions of artificial and natural resins or viscose solutions or even already preformed, flexible and still moist hollow bodies may also serve as the material for the hollow bodies to be produced.

The application of liquid masses to the mould can also be effected by squirting or pouring on.

After the hollow bodies have dried sufficiently on the moulds, the individual moulds are taken out of the dipping apparatus, the rubber ring D is removed and the screw threaded joints F are connected with a compressed air pipe M (Figure 2). It has been shown that even a slight air pressure is sufficient to blow the rubber bag together with the set hollow body away from the mould. The stripping can be assisted by a light pressure against the end face N. Such aids are mostly not necessary, however, if prior to drawing over the rubber skin the massive core A is coated with a smoothing layer of lacquer and is lightly dusted with talcum powder. Also, smoothing means, such as glycerine, etc. may be used.

After the hollow body with the rubber skin have been blown off by the air, the skin or bag contracts as the tension is relieved and separates itself from the hollow body. The rubber skin, which is now loose in the hollow body, as shown in Figure 3, can be withdrawn and used again for the production of other hollow bodies.

In order to obtain hollow bodies with end faces as smooth as possible, it is advantageous to make the mouth of the air channel B in the form of a flat funnel O, the wide orifice of which is firmly spanned by the rubber skin. By this means the moulding of the mouth of the channel B into the hollow body is avoided.

By employing moulds of this kind, hollow bodies of conical and cylindrical form as well as of oval, angular, etc., cross section may be produced of almost any desired size.

The following are special advantages of the method and apparatus according to the invention. The releasing of the hollow bodies together with the rubber skin can be effected easily and rapidly even with multiedged models, whereas with the known method the releasing operation, particularly with edged models, requires special care and therefore takes some time. The new method facilitates the production of hollow bodies with perfectly smooth surfaces and perfectly uniform quality in each piece. It is of particular advantage that thin walled hollow bodies of 0.05 mm. thickness and under may be produced in any desired size. The production of extremely thin walled hollow bodies was hitherto very difficult. On the other hand the new models are also suitable for making very thick walled hollow bodies of 1 mm. thickness and more. The assembling of the mould for the manufacture and also the removal of the hollow bodies are extraordinarily simple so that very little attention and very few working operations are necessary. It may also be mentioned that the mould may be manufactured cheaply and is very durable.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I

claim is :—

1. A method of producing hollow bodies from cellulose products and other plastic masses, in which the plastic mass is applied to a mould, for example of wood, metal and the like, over which an elastic skin, for example of rubber is placed under preliminary tension in the direction in which the hollow body is stripped from the mould, and in which after solidification of the mass the preliminary tension of the rubber skin is removed and air is blown in between the mould and rubber skin in order to strip the hollow body and the elastic skin from the mould.

2. A method according to claim 1, in which prior to the application of the elastic skin the mould is smoothed or polished by suitable means, for example by applying a coating or layer of lacquer, talcum, glycerine or the like.

3. A mould for carrying out the method according to claim 1 or 2, and having means, for example a groove having a fitting rubber ring or the like in order that the elastic skin, for example of rubber, placed on the mould may be subjected to tension substantially in the direction in which the hollow body is stripped from the mould.

4. A mould for carrying out the method according to claims 1 or 2 wherein the mould has one or more channels for permitting the blowing in of the air, with enlarged outlet orifices, for example of funnel shape.

Dated this 16th day of January, 1936.

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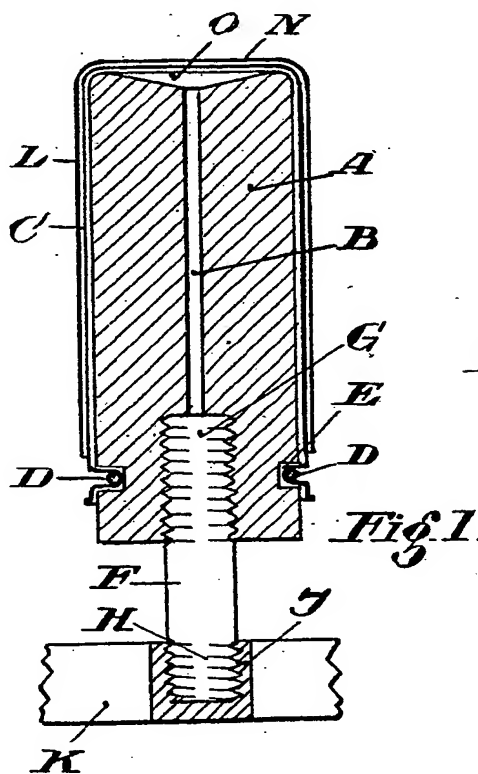


Fig. 2.

